

Atty. Docket No. 042390.P6604

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

In Re Patent Application of:)

Kevin J. Lee)

Examiner: Leader, William T.)

Application No.: 09/223,472)

Art Unit: 1741)

Filed: December 30, 1998)

For: ELECTROPLATING CELL BASED)
UPON ROTATIONAL PLATING)
SOLUTION FLOW)

Asst. Commissioner for Patents
Washington, D.C. 20231

BOARD OF PATENT APPEALS
AND INTERFERENCES

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APPEAL BRIEF

IN SUPPORT OF APPELLANTS' APPEAL
TO THE BOARD OF PATENT APPEALS AND INTERFERENCES

Sir:

The Appellant hereby submits this Brief in triplicate in support of their appeal from a final decision by the Examiner, mailed June 4, 2002, in the above-captioned case. The Appellant respectfully requests consideration of this appeal by the Board of Patent Appeals and Interferences for allowance of the above-captioned

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Serial No.: 09/223,472
Examiner: Leader, William

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APPEAL BRIEF
Art Unit: 1561

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I. REAL PARTY IN INTEREST

The real party of interest in Intel Corporation, a corporation of Delaware having a principle place of business at 2200 Mission College Boulevard, Santa Clara, California, 95050.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF THE CLAIMS

Claims 1-5 and 18-33 are currently pending. Claims 6-17 have been cancelled. Claims 1-5 and 18-33 currently stand rejected by the Examiner under the final rejection mailed October 7, 2002.

Claims 1-5 and 18-33 stand rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1, 3, 4, 5, 18, 19, 22, 23, 27, 29 and 30 stand rejected under 35 USC § 102(b) as being anticipated by Norris, U.S. Patent No. 4,151,062 (hereinafter Norris). Claims 1-5, 18-24, and 27-31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mori, U.S. Patent No. 5,443,707, (hereinafter Mori) in view of Norris. Claims 1, 3-5, 18-20, 22-24, 27, and 29-31 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Eidschum, U.S. Patent No.

4,443,304, (hereinafter Eidschum). Claims 21 and 28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Eidschum.

IV. STATUS OF AMENDMENTS

A copy of all claims on appeal is attached in Appendix A hereto.

V. SUMMARY OF INVENTION

The present invention discloses a method of applying a liquid material on to a substrate surface. The liquid material is applied by placing the substrate surface within an enclosure, and introducing the liquid material into the enclosure. The liquid material is directed angularly toward the substrate surface so that the liquid material flows rotationally upon contact with the substrate surface. In conjunction with the method there is also described an apparatus for coating a substrate with the liquid material. There is a chamber having interior walls, where the chamber has a first end and an opposing second end. An opening in the first end holds the substrate. An inlet pipe having an end that is directed within the chamber is coupled to the second end of the chamber. A nozzle is coupled to the end of the inlet pipe, to which the liquid material is sprayed generally toward the substrate surface, wherein the liquid material flows rotationally with the contact with the substrate. (See page 3, lines 17-26 of the present specification). The nozzle contains outlets which direct the liquid at an angle from perpendicular. (See page 5, lines 6-7).

VI. ISSUES

The issues presented in this appeal are:

- Whether claims 1-5 and 18-33 are unpatentable under 35 USC § 112, second paragraph, as being indefinite for failing to particularly and distinctly claim the subject matter which applicant regards as the invention;
- Whether claims 1, 3, 5, 18, 19, 22, 23, 27, 29 and 30 are unpatentable under 35 USC § 102(b) as being anticipated by Norris;
- Whether claims 1-5, 18-24 and 27-31 are unpatentable under 35 USC § 103(a) as being obvious over Mowry in view of Norris;
- Whether claims 1, 3-5, 18-20, 22-24, 27, 29-31 are unpatentable under 35 USC § 102(b) as being anticipated by Eidschum; and
- Whether claims 21 and 28 are unpatentable under 35 USC § 103(a) as being obvious over Eidschum.

VII. GROUPING OF CLAIMS

For the purpose of this Appeal claims 1-5 and 18-33 stand or fall together as group one.

VIII. ARGUMENT

A. REJECTION OF THE PRESENT INVENTION IS IMPROPER SINCE THE CLAIMS ARE NOT INDEFINITE AND PARTICULARLY POINT OUT AND DISTINCTLY CLAIM THE SUBJECT MATTER WHICH APPLICANT REGARDS AS THE INVENTION

With respect to independent claim 1, independent claim 1 recites:

1. A method of applying a material onto a substrate surface, comprising:
exposing a surface of a substrate to a liquid, containing a material, in an enclosure; and
directing more of the liquid from an outlet which, when viewed from the front, is off-center from a central access of the substrate normal to the surface, and, when viewed from the right, is at an angle other than normal to the surface so that the liquid flows rotationally over the surface about the central access, the material depositing on the surface.

Examiner rejected claim 1 under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The examiner argues that what is considered "when viewed from the front," has not been defined. Further, the examiner argues that it appears that the applicant is referring to the enclosure but has not specified a manner for determining what section is "the front." Examiner also rejected independent claim 18 on similar grounds.

The Appellant submits that the invention is not indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In independent claims 1 and 18, the phrases "when viewed from the front" followed by "when viewed from the right" are relative phrases. When the outlet is viewed from a direction from which the outlet appears off-center from a central axis of the substrate normal to the surface, then viewed from a second direction that is obtained by rotating the outlet 90 degrees right to left, or viewing it from the right side relative to the first direction, the outlet is at an angle other than normal to the surface so that liquid flows rotationally over the

surface of the substrate about the central axis. Figure 2 demonstrates the relativity of the phrases. If it is assumed that Figure 2 is a front view of the invention, as can be seen, outlet 344 is off-center from a central access of a substrate normal to the surface, however, if the same figure were to be viewed from the right, outlet 344 would be lying on the central access at an angle other than normal to the surface, so that the liquid would flow rotationally over the surface about the central access. Likewise, if it is assumed that Figure 2 is a view from the right as it can be seen, outlet numbered 346 is lying on the central axis is at an angle other than the normal to the surface so the liquid flows rotationally over the surface about the central access. However, if Figure 2 were then viewed from the right, outlet numbered 346 would be off-center from the central axis to the substrate normal to the surface. The phrases "viewed from the front" and "viewed from the right" are thus relative terms and the two views are 90 degrees apart. Therefore, claims 1 and 18 should not be rejected because claims 1 and 18 are not indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Examiner also noted that claims 24 and 31 recite that at least one of the spray outlets is pointed in a perpendicular direction toward the substrate.

Claims 24 and 31 are dependent on either claim 1 or 18 and should not be rejected for the same reasons as claims 1 and 18.

**B. REJECTION OF THE PRESENT INVENTION IS IMPROPER
BECAUSE NORRIS DOES NOT INCLUDE OUTLETS THAT
ARE AT AN ANGLE OTHER THAN NORMAL TO THE
SURFACE**

The Examiner rejected claims 1, 3, 4, 5, 18, 19, 22, 23, 27, 29, and 30 under 35 U.S.C. §102(b) as being anticipated by Norris. The Examiner argues that Norris teaches that directional nozzles dictate a plating pattern when a fluid is introduced through a plurality of outlets which are off-center from the central axis of a substrate normal and are at an angle which is other than normal to the surface. Additionally, the Examiner argues that Norris teaches that the nozzles are arranged to move the fluid in a circular pattern and that the flowing liquid would have a circumferential and radial component as recited in instant claims 23 and 30 and be directed radially outward as recited in instant claims 22 and 29.

Appellants submit that the present invention is not anticipated by Norris. Both independent claims 1 and 18 include the limitation that when the outlet is viewed from the right it is at an angle other than normal to the surface. Norris discloses a metals recovery apparatus and process for use with an electroplating system acting to remove metals from a used plating solution. A series of nozzles 128, 130, 132, 134, 136, 138 are placed between two plate electrodes 108 and 110, and are arranged to create a swirling motion of the solution between the plate electrodes 108 and 110. In order to effectively distribute the plating solution to both plate electrodes 108 and 110, the nozzles 128, etc., placed between the two plate electrodes 108 and 110, must be parallel to the plate electrodes 108 and 110 or the plating solution will not be distributed evenly between them. Norris thus shows

outlets 128 etc., which are parallel to the plate electrodes 108 and 110. Specifically, Norris does not disclose an outlet that when viewed from the right is at an angle other than normal to the surface as included in claims 1 and 18. Therefore, claims 1 and 18 are not anticipated by Norris because claims 1 and 18 each include a limitation not disclosed by Norris.

Claims 3, 4, 5, 19, 22, 23, 27, 29, and 30, are dependent on either claim 1 or 18 and should not be rejected for the same reasons as claims 1 and 18.

**C. REJECTION OF THE PRESENT INVENTION IS IMPROPER
BECAUSE MORI AND NORRIS DO NOT TEACH HAVING
AN OUTLET AT AN ANGLE OTHER THAN NORMAL TO
THE SURFACE**

The Examiner rejected claims 1-5, 18-24, and 27-31 under 35 U.S.C. 103(a) as being unpatentable over Mori in view of Norris. The Examiner argues that it would have been obvious to utilize the additional nozzles shown in Norris in Mori.

Appellants submit that the present invention is patentable over Mori in view of Norris. Both independent claims 1 and 18 include the limitation that when the outlet is viewed from the right it is at an angle other than normal to the surface. Mori teaches an apparatus for electroplating a semiconductor substrate with a metallic film having a uniform thickness. The uniformity of the thickness is created by use of an anode and a cathode. The arrangement of the anode is such that the intensity distribution of the electric field generated on the main surface to be plated is made substantially uniform. The plating solution is introduced through a single

injection hole attached to an injection line, which is perpendicular to the substrate, as shown in Figure 3. As already discussed, Norris teaches nozzles placed between and parallel to two plate electrodes. Furthermore, for the plating solution to be evenly distributed between the two plate electrodes, the nozzles must be parallel. Mori and Norris thus teach either having a single injection line perpendicular to a substrate or multiple nozzles placed between and parallel to two plate electrodes. Specifically, neither Mori nor Norris teaches having an outlet that when viewed from the right is at an angle to the substrate surface as included in claims 1 and 18. Therefore, claims 1 and 18 are not obvious over Mori in view of Norris because Mori and Norris in combination fail to disclose at least one limitation in each of claims 1 and 18.

Claims 2-5, 19-24, and 27-31 are dependent on either claim 1 or 18 and should not be rejected for the same reasons as claim 1 and 18.

**D. REJECTION OF THE PRESENT INVENTION IS IMPROPER
BECAUSE EIDSCHUM DOES NOT INCLUDE FLOWING
THE LIQUID ROTATIONALLY OVER THE SURFACE OF
THE SUBSTRATE ABOUT THE CENTRAL AXIS**

The Examiner rejected claims 1, 3-5, 18, 19, 20, 22, 23, 24, 27, and 29-31 under 35 U.S.C. 102(b) as being anticipated by Eidschum. The Examiner argues that in Eidschum the fluid is injected through a plurality of nozzles, which are off-center from a central axis of the substrate and at an angle other than normal to the surface.

Appellants submit that the present invention is not anticipated by Eidschum. Both independent claims 1 and 18 include the limitation that the outlet is at an angle other than normal to the surface so that the liquid flows rotationally over the surface about the central access. Eidschum discloses a plating module 10 and a method in a cell which has linearly spaced vertical anodes 49, and intermediately positioned spargers 50 which can be angularly adjusted with their nozzles 55 impinging directly or at an acute angle on the printed circuit boards 20 positioned at a mid-point in each cell. Figure 5 shows a fluid being injected through nozzles 55 all of which are facing the same direction across the entire surface of the printed circuit board 20. The fluid is distributed in one direction across the printed circuit board 20. Eidschum thus discloses distributing a fluid in a single direction onto a printed circuit board 20 with nozzles 55. Specifically, Eidschum does not disclose having an outlet other than normal to the surface so that the liquid flows rotationally over the surface about the central access. Therefore, the present invention is not anticipated by Eidschum because claims 1 and 18 each include a limitation not disclosed by Norris.

**E. REJECTION OF THE PRESENT INVENTION IS IMPROPER
BECAUSE EIDSCHUM DOES NOT INCLUDE FLOWING
THE LIQUID ROTATIONALLY OVER THE SURFACE OF
THE SUBSTRATE ABOUT THE CENTRAL AXIS**

The Examiner rejected claims 21 and 28 under 35 U.S.C. §103(a) as being unpatenable over Eidschum.

Claims 21 and 28 are dependent on either independent claims 1 or 18 and are patentable for the same reasons as claims 1 and 18.

IX. CONCLUSION

For the foregoing reasons, the Appellants respectfully assert that claims 1-5 and 18-33 overcome the cited references and are therefore patentable. Those dependent claims not specifically address or deemed allowable in view of their dependency from an independent claim as argued above in addition to adding further limitations of their own. For the reasons presented herein, the removal of the present rejections and allowance of the present claims is respectfully requested.

Please charge any shortages and credit any overages to Deposit Account No. 02-2666. Any necessary extension of time for response not already requested is hereby requested. Please charge any corresponding fee to Deposit Account No. 02-2666.

Respectfully submitted,
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Date: _____

12/30/02



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X. APPENDIX A

The claims on appeal including the amendment mailed by the Appellant on January 30, 2002 read as follows:

1. (Three Times Amended) A method of applying a material onto a substrate surface, comprising:

exposing a surface of a substrate to a liquid, containing a material, in an enclosure; and

directing more of the liquid from an outlet which, when viewed from the front, is off-center from a central axis of the substrate normal to the surface, and, when viewed from the right, is at an angle other than normal to the surface so that the liquid flows rotationally over the surface about the central axis, the material depositing on the surface.

2. (Twice Amended) A method of applying a material as in claim 1, further comprising:

pressing the substrate against the enclosure to form a seal.

3. (Twice Amended) A method of applying a material as in claim 1, further comprising:

coupling a cathode contact to the substrate surface,

wherein the material plates onto the surface.

4. (Twice Amended) A method of applying a material as in claim 3, further comprising:

forming a metallic film on the substrate surface.

5. (Amended) A method of applying a material as in claim 4, wherein the metallic film includes copper.

18. (Three Times Amended) A method of electroplating a material onto a substrate surface within an enclosed chamber, comprising:

securing a substrate within an opening in a chamber so that a surface of the substrate faces an interior of the chamber;

coupling a cathode to the substrate;

introducing an electrochemical liquid into the chamber through an outlet which, when viewed from the front, is off-center from a central axis of the substrate normal to the surface, and, when viewed from the right, is at an angle other than normal to the surface so that the liquid flows rotationally over the surface about the central axis, material plating out of the liquid onto the surface.

19. (Twice Amended) A method of electroplating a material as in claim 18, wherein introducing a liquid further includes spraying the liquid out of a plurality of spray outlets at least two of the outlets contributing to said rotational flow about the axis over the surface.

21. (Twice Amended) A method of electroplating a material as in claim 19, wherein the spray outlets are angled at approximately 20 to 60 degrees relative to the surface.
22. (Amended) A method of electroplating a material as in claim 21, wherein said liquid is directed radially outward with respect to the axis.
23. (Amended) A method of electroplating a material as in claim 22, wherein said liquid has a circumferential component and a radial component relative to the axis.
24. A method of electroplating a material as in claim 19, wherein at least one of the plurality of spray outlets is pointed in a perpendicular direction toward the center of the substrate surface.
25. A method of electroplating a material as in claim 24, wherein said plurality of spray outlets includes at least four spray outlets forming a cross pattern.
26. A method of electroplating a material as in claim 25, wherein said plurality of spray outlets further includes at least one spray outlet located at the center of the cross pattern.
27. (Amended) A method of applying a material onto a substrate surface as in claim 1, wherein introducing the liquid further includes spraying the liquids out of a

plurality of spray outlets at least two of the outlets contributing to said rotational flow about the axis over the surface.

28. (Amended) A method of applying a material onto a substrate surface as in claim 27, wherein the two spray outlets are angled at approximately 20 to 60 degrees from the surface.

29. (Amended) A method of applying a material onto a substrate surface as in claim 1, wherein the liquid is directed radially outward with respect to the center of the substrate surface.

30. (Amended) A method of applying material onto a substrate surface as in claim 1, wherein the liquid has a circumferential component and a radial component relative to the axis.

31. (Amended) A method of applying a material onto a substrate surface as in claim 27, wherein at least one of the plurality of spray outlets is pointed in a perpendicular direction toward the center of the substrate surface.

32. (Amended) A method of applying a material onto a substrate surface as in claim 27, wherein the plurality of spray outlets includes at least four spray outlets forming a cross pattern.

33. (Amended) A method of applying a material onto a substrate surface as in claim 27, wherein the plurality of spray outlets further includes at least one spray outlet located at the center of the cross pattern.